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The Right Time and Place: A New Approach for Prioritizing Alcohol Enforcement and Prevention Efforts by Combining the Prevalence and the Success Rate for Minors Purchasing Alcohol Themselves

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ABSTRACT

Objective: In the Netherlands, enforcement of the alcohol age limit is low and inconsistent because of limited resources. A solution is to optimize the efforts of enforcement officers by prioritizing ways in which they regulate commercial alcohol availability. This could increase compliance by sellers, curbing commercial availability. The objective of this study is to present the development of a commercial alcohol availability estimate (CAAE) for all vendor types selling alcohol and to propose a priority ranking. **Method:** A multi-method design was used, combining data (collected in 2015) from national studies reporting behavior of minors purchasing alcohol themselves and the success rate (noncompliance) of alcohol vendors (interviewing 510 minors by telephone and conducting 1,373 purchase attempts of alcohol by minors, respectively). Descriptive data and the development of the CAAE are presented. **Results:** Compared with other vendor types (e.g., sports bars or supermarkets), bars/cafes/discos scored highest on the CAAE, indicating that 7.7% of 16- to 17-year-olds in the survey reported successfully purchasing their own alcohol at this vendor type. **Conclusions:** To control commercial alcohol availability efficiently for minors in the Netherlands, our estimates suggest that enforcement and prevention efforts should prioritize bars/cafes/discos. However, local authorities should also consider local circumstances and maintain a base

amount of attention for all vendor types. Ultimately, the CAAE has the potential to improve enforcer capacity and efficiency in policing commercial alcohol regulation, and prevention workers could align their interventions or campaigns to high-ranked vendor types. (*J. Stud. Alcohol Drugs, 81,* 000–000, 2020)

It is generally accepted that increased enforcement of alcohol age limits improves effectiveness of the measure. In previous research, substantial benefits of enhanced enforcement have been found and shown to be effective to reduce alcohol sales to minors (Lewis et al., 1996; Preusser et al., 1994). Even moderate increases of enforcement can reduce sales of alcohol to minors by as much as 35%–40% (Grube, 1997; Wagenaar et al., 2000). Furthermore, and within a community-wide prevention uptake, increased enforcement can even reduce adolescent heavy drinking and related harm (Holder et al., 2000; Schelleman-Offermans et al., 2012; Wagenaar et al., 2005).

In Western countries such as the United States and the Netherlands, levels of enforcement of the alcohol age limit are low and inconsistent (Kruize et al., 2016; Toomey et al., 1996; Wagenaar & Toomey, 2002). When mentioning enforcement in this study, focus is on the strategy of imposing fines and/or license suspensions/revocations by government on alcohol vendors selling alcohol to underage youth. This study is set in the Netherlands, in which municipalities are responsible for enforcement (including enforcement capabilities for alcohol vendors selling to minors), and the alcohol age limit is set at 18 years for sale and possession of alcohol (Dutch National Government, 2017).

When Dutch policy workers were asked about reasons behind low and inconsistent levels of enforcement, 54% indicated a shortage of time (47%), budget (46%), and personnel (34%) as the main hindering factors (Kruize et al., 2016). Furthermore, the likelihood of apprehension resulting from enforcement efforts is low (28%) in the Netherlands (Schelleman-Offermans et al., 2012). This limited enforcement is problematic because it undermines potential and effectiveness of the alcohol age limit policy in reducing commercial availability for minors (Burton et al., 2016; Paschall et al., 2009; Wagenaar & Toomey, 2002), which in turn increases odds for minors to be exposed to immediate and long-term risks of using alcohol early in life (Babor et al., 2010; Clark et al., 2008; Feldstein Ewing et al., 2014; McCambridge et al., 2011; Welch et al., 2013).

One way of increasing possible enforcement effects without using additional resources is to prioritize enforcement efforts toward those alcohol vendors who are popular among minors and where compliance rates are low. Thus, valid indicators for prioritizing enforcement efforts could be compliance rates of alcohol vendors with the alcohol age limit and popularity of vendors among underage youth. In the Netherlands, alcohol home delivery outlets (AHDOs; 2.8% compliance on average) and sports bars (11.1% compliance on average) are two vendor types that showed the lowest scores on compliance (Roodbeen & Schelleman-Offermans, 2016; Van Hoof et al., 2015). Regarding popularity of vendors among underage youth in the Netherlands, findings showed that cafes/bars/discos (9%) and supermarkets (7%) are places mentioned most often by minors for purchasing their own alcohol (Stevens et al., 2018).

It could be concluded, by solely looking at compliance rates, that commercial alcohol availability for minors is highest in AHDOs and sports bars. However, cafes/bars/discos are the most prevalently used sources of alcohol for minors when it comes to buying their own alcohol. This raises the question which of these alcohol vendor types should have priority for enforcement officers. In this study (based on a Dutch report by Schelleman-Offermans et al., 2015), we try to answer this question by combining data on purchasing behavior of minors using survey research (Kruize & Bieleman, 2015) and compliance data using mystery shopping research (Schelleman-Offermans & Roodbeen, 2015). The aim of this study is to present the development of a commercial alcohol availability estimate (CAAE) for all vendor types selling alcohol. This is the first scientific study, to the best of our

knowledge, that combines prevalence of adolescents' use of a certain vendor type with compliance rates of the same vendor type into one estimate (CAAE). Development of such an estimate provides important information for enforcement officers to regulate commercial alcohol availability more efficiently and for prevention workers to align their campaigns regarding self-purchasing (and drinking) behavior of minors.

Method

Methods used in this study were not deemed to be medical research (subjects are not manipulated or adversely affected in any way), and, for this reason, were exempt from Dutch WMO law (Medical Research Involving Human Subjects Act), which is the legal charter of the Helsinki Declaration (CCMO, 1999). Methods secured anonymity, privacy, and legal integrity of participants, vendors, employees, mentors, and mystery shoppers.

Survey (random digit dialing)

Between May and June 2015, cross-sectional and nationwide representative survey data were collected over an 8-week period, asking 16- to 17-year-olds for their actual drinking and alcohol-purchasing behavior (performed by research institute Breuer&Intraval and previously published in a Dutch report; Kruize & Bieleman, 2015). Data were gathered by calling selected households on their landline or mobile telephone connection. In total, 510 minors (16- to 17-year-olds) were successfully questioned, with a final response rate of 42.3%. Descriptive results were presented, with overall drinking and purchasing behavior of minors. The total number of minors reporting purchasing alcohol themselves (or attempting to self-purchase), the reported number of self-purchase attempts in the preceding month, and the calculated and estimated number of self-purchase attempts were presented per vendor type. Supplemental Appendices A–C appear as online-only addenda to this article on the journal's website; Appendix A provides a full description of methods.

Mystery shopping

Data collection and processing (performed by research institute Nuchter and previously published in a Dutch report; Schelleman-Offermans & Roodbeen, 2015) took place in accordance with validated protocols, including ethical and legal aspects regarding this research, as described and conducted in Van Hoof et al. (2015) and Schelleman-Offermans et al. (2017). Between March and May of 2015, cross-sectional and nationwide representative data were collected by conducting alcohol purchase attempts by 17-year-old mystery shoppers. A random stratified sample of vendors was drawn, weighted according to population density. In total, 1,373 purchase attempts were successfully performed. The primary outcome measure was refusal/compliance rate (vendors not selling alcohol to mystery shoppers). In other words, in this study, compliance was valid when a mystery shopper attempted to purchase alcohol directly from the vendor and the vendor refused to sell alcohol. Descriptive results were presented, with compliance rates and success rate (percentage in which minors were able to purchase alcohol) for every vendor type. Confidence intervals (95%) using Wilson's score (Wilson, 1927) were calculated. Appendix B provides a full description of methods.

Combined data

Combining, merging, and performing initial analysis on both data sets were performed by authors K.S.-O., A.K., R.R., and B.B. in a Dutch report (Schelleman-Offermans et al., 2015). Independent supermarkets were excluded from the data set because different definitions for independent supermarkets were applied in two combined studies and therefore, not comparable between the

two data sets. Only purchase attempts of 16-/17-year-olds were used from survey data (excluding data from 14-/15-year-olds) to ensure comparability with 17-year-old mystery shoppers.

[Figure 1]

Combined measures

To construct the CAAE for each vendor type, the number of minors who reported attempts (successful and unsuccessful attempts) of purchasing their own alcohol at a specific vendor type in the preceding year (derived from survey results) was multiplied by the success rate at the same specific vendor type (derived from mystery shopping results), divided by 100. The outcome of the CAAE is an estimated success rate for minors purchasing alcohol, combining prevalence of self-purchase attempts by the minor and the actual success rate for different vendor types.

Results

Figure 1 presents overall drinking behavior of 16- to 17-year-olds and their sources of alcohol. Of all minors, 72.9% reported drinking alcohol in the preceding year. Within this group of drinkers, 16.9% reported purchasing (or attempting to purchase) alcohol themselves in commercial sources. A small number of nondrinkers (2.2%) reported self-purchase attempts of alcohol for others. In sum, 66 minors (12.9% of all 510 minors in the survey) reported attempting to purchase alcohol themselves and did this mostly at bars/cafes/discos (71.2%). The group of minors attempting to self-purchase alcohol in commercial sources was not asked about the frequency that alcohol was given to them by social sources. Furthermore, 83.1% of minors drinking alcohol reported never attempting to purchase alcohol themselves, but rather obtaining alcohol through social sources. This group of minors reported obtaining their alcohol mostly from friends (60.8%).

Table 1 presents purchase attempts, success rate, and the CAAE per vendor type. A total of 9.2% of all minors in the survey reported buying their own alcohol in bars/cafes/discos, followed by supermarkets (3.1%), take-away restaurants (2.5%), sports bars (2.0%), liquor stores (1.6%), night shops (1.0%), and AHDOs (0.4%). Success rate results showed that in the Netherlands, sports bars (91.5%) scored the highest success rate for 17-year-old mystery shoppers. Compared with other vendor types, supermarkets significantly scored the lowest success rate (confidence intervals with a success rate of 47.5% [42.7%, 52.4%] show no overlap with other vendor types).

Based on these results, the CAAE was calculated, showing that 7.7% of all 16-/17-year-olds in the survey successfully purchased their own alcohol (or attempted to purchase their own alcohol) in bars/cafes/discos (meaning that sellers do not comply). The ranking in Table 1 was based on these results, with bars/cafes/discos on top. In the next column, reported number of self-purchase attempts represents reported responses of participants in the survey. To calculate the number of times minors purchased (or tried to purchase) their own alcohol in the preceding month, the number of participants in the survey who responded to each measure are recoded (using midpoints of categories) into estimated frequencies (i.e., “1 to 3 times a month” category corresponds to 24 purchase attempts a year [2 times a month × 12 months a year]).

[Table 1]

To the highest category, “1 or more times a week,” 25% of total number of weeks in a year (rounding up to approximately 14 weeks) was added because of framing (“or more”) of the question (52 purchase attempts a year + 14 purchase attempts). Following these estimated frequencies (and assuming that self-purchasing behavior of minors was constant throughout the year), in the year preceding the survey, a total estimated number of 1,632 self-purchase attempts were performed in

bars/cafes/discos by minors who completed the survey (51.3% of all attempts). On average, minors performed an estimated 24.7 self-purchase attempts of alcohol in the preceding year in bars/cafes/discos. The CAAE, in an estimated average number of successful self-purchase attempts per minor per year at bars/cafes/discos, was 20.7.
Using bars/cafes/discos as an example, the general equation for calculating the CAAE was: (9.2 × 83.8) / 100 = 7.7; (35 × 24) + (12 × 66) = 1,632; 1,632 / 66 = 24.7; (24.7 × 83.8) / 100 = 20.7. Supplemental Appendix C provides a more elaborate description of underlying calculations in the CAAE using bars/cafes/discos, followed by hypothetical examples of high- and low-ranking percentages, further explaining the interpretation of ranking percentages.

Discussion

Prior work has documented benefits of enhanced enforcement in reducing alcohol sales to minors, drinking behavior, and associated harm (e.g., Grube, 1997; Lewis et al., 1996; Schelleman-Offermans et al., 2012). However, previous studies have not offered tools or information on how to prioritize enforcement efforts without using additional resources. Based on a Dutch report (Schelleman-Offermans et al., 2015), this is the first scientific study that provides such a tool by the development of the CAAE for all vendor types selling alcohol, in which data on purchasing behavior of minors (Kruize & Bieleman, 2015) and compliance data (Schelleman-Offermans & Roodbeen, 2015) are combined into one estimate. The general benefit of using the CAAE, instead of solely using compliance or survey rates, is that it indicates which vendor types are being used successfully by underage people to purchase their own alcohol. Prioritizing enforcement and prevention efforts to these popular and low-complying vendors optimizes the effects of these efforts without using additional resources.

The CAAE showed that 7.7% of all 16-/17-year-olds in the survey reported purchasing their own alcohol at bars/cafes/discos and are expected to be successful in doing so. Compared with other outlet types, bars/cafes/discos scored highest on the CAAE. This finding could provide enforcement authorities with additional support and substantiation for optimizing deployment of their already-limited enforcement facilities. Prevention workers could align their campaigns or interventions with this result, discouraging purchasing and drinking behavior focused on bar/cafe/disco settings. Furthermore, they could offer alcohol sellers recommendations for increasing compliance, and, in addition, local regulators could use the CAAE as a basis for determining their alcohol hotspots. Although the CAAE presented in this study based on national data offers a solid starting position for municipalities aiming to prioritize their efforts, local authorities should also consider local circumstances in defining priority. Furthermore, all vendor types, regardless of priority, should receive a basic amount of structured attention.

In calculating the CAAE, we have focused on minors purchasing their own alcohol (not on social supply), because local authorities in the Netherlands only have enforcement capabilities with respect to these occurrences and can only be effective in these areas. However, in future research, with regard to curbing alcohol availability from more than one viewpoint, social or secondary supply of alcohol should be investigated as well, because alcohol is available to minors in several ways (e.g., obtaining alcohol from friends or parents; Gilligan et al., 2012; Harrison et al., 2000; Roodbeen et al., 2018).

Limitations

Regarding development of the CAAE, we only have nationwide survey and mystery shopping data available from 2015; using more recent data could provide us with a more present-day priority setting and is recommended. In this study, national data sets are used to give insight into a nationwide situation. Nevertheless, local differences in compliance and purchasing behavior could

exist. Therefore, future research should include local data and could provide a more specified and locally tailored priority setting. The total number of minors who indicated buying (or attempting to buy) their own alcohol was limited (n = 66). In addition, coding used to operationalize monthly self-purchase attempts consists of an approximate estimate. In future research, a larger sample and more detailed categories measuring monthly purchasing behavior could facilitate a more accurate priority setting. We have merged bars/cafes/discos into one category. Despite homogeneous compliance results between on- and off-premise outlets, in future research, we suggest separately examining bars/cafes/discos because differences in nightlife settings are conceivable between these subtypes.

Conclusions

Ultimately, the CAAE has the potential to improve enforcer capacity and efficiency in policing commercial alcohol regulation. By using the CAAE, prevention workers could align their interventions or campaigns to high-ranked vendor types that are being used successfully by underage youth to purchase their own alcohol. This could contribute to increased compliance and, subsequently, help curb commercial alcohol availability to minors (Burton et al., 2016; Paschall et al., 2009; Wagenaar & Toomey, 2002) and associated harm (Babor et al., 2010; Clark et al., 2008; Feldstein Ewing et al., 2014; McCambridge et al., 2011; Welch et al., 2013). Development of the CAAE can be applied to different countries/cultures within a range of settings (e.g., using national or local data) and can easily be calculated for other restricted (addictive) projects (e.g., tobacco products, as performed in a Dutch report [Kruize et al., 2017]).

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Conflict-of-Interest Statement

There are no conflicts of interest for all named authors.

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Table and Figure

Figure 1 Overall drinking and purchasing behavior of 16-/17-year-olds. Notes: Multiple answering was allowed for reporting commercial and social sources. Adolescents reporting purchase attempts at commercial sources (vendors) were not asked about the frequency social sources supplied them with alcohol. Data presented in this figure are derived from survey results performed by Breuer&Intraval. [a]AHDOs = alcohol home delivery outlets.

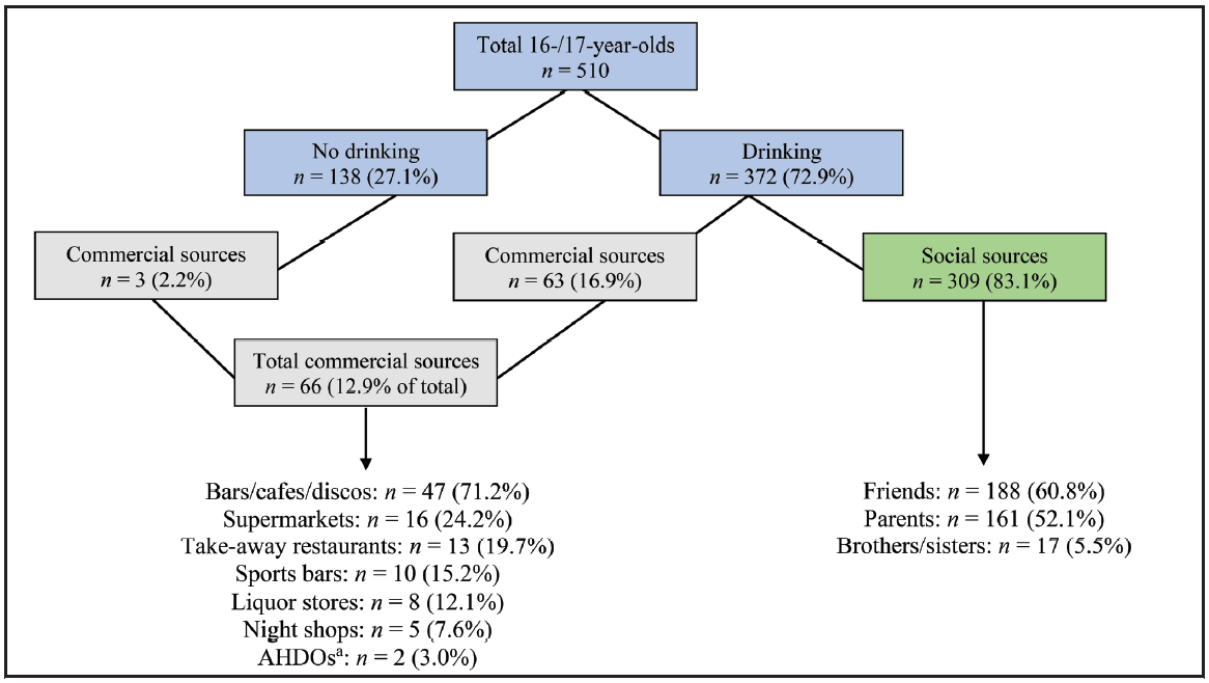

Table 1 Purchase attempts, success rate, and CAAE per vendor type

Location	% of minors reporting self-purchasing (or attempting to self-purchase) their alcohol (*n* = 510)[a]	Success rate (noncompliance) [95% CI]	CAAE in % for all minors successfully self-purchasing alcohol	Reported no. of self-purchase attempts in the preceding month[a]			Calculated & estimated no. of self-purchase attempts in a year (*n* = 66)	Calculated & estimated average no. of self-purchase attempts per minor, per year	CAAE in average no. of successful self-purchase attempts per minor, per year	Ranking
				Never	1–3 times a month	≥1 time a week				
Bars/cafes/discos	9.2	253 (83.8%) [79.2, 87.5]	7.7	19	35	12	1,632 (51.3%)	24.7	20.7	1
Take-away restaurants	2.5	95 (89.6%) [82.4, 94.1]	2.3	53	11	2	396 (12.5%)	6.0	5.4	2
Sports bars	2.0	86 (91.5%) [84.1, 95.6]	1.8	56	9	1	282 (8.9%)	4.3	3.9	3
Supermarkets	3.1	190 (47.5%) [42.7, 52.4]	1.5	50	15	1	426 (13.4%)	6.5	3.1	4
Liquor stores	1.6	208 (67.1%) [61.7, 72.1]	1.1	58	7	1	234 (7.4%)	3.5	2.4	5
Night shops	1.0	38 (66.7%) [53.7, 77.5]	0.7	64	4	1	162 (5.1%)	2.5	1.6	6
AHDOs	0.4	50 (90.9%) [80.4, 96.1]	0.4	64	2	0	48 (1.5%)	0.7	0.7	7

Notes: Example of calculations for bars/cafes/discos: (9.2 × 83.8) / 100 = 7.7; (35 × 24) + (12 × 66) = 1,632; 1,632 / 66 = 24.7; (24.7 × 83.8)/100 = 20.7. Multiple answering was allowed for the percentage of minors reporting self-purchasing (or attempting to self-purchase) their alcohol. Data presented in this table are derived from survey results performed by Breuer&Intraval and mystery shopping results performed by Nuchter, Centre for Research on Age Restrictions. CAAE = commercial alcohol availability estimate; no. = number; AHDOs = alcohol home delivery outlets; CI = confidence interval. [a]These columns represent reported responses of participants in surveys.